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Antibiotic Use on U.S. Dairy Operations, 2002 and 2007

In 2007, the U.S. Department of Agriculture's (USDA) National Animal Health Monitoring System (NAHMS) conducted the Dairy 2007 study. In all, 17 of the Nation's major dairy States*, representing 79.5 percent of U.S. dairy operations and 82.5 percent of U.S. dairy cows, participated in the study. In the Dairy 2002 study, 21 major dairy States participated, representing 82.9 percent of operations and 85.5 percent of dairy cows.

One goal of the Dairy 2007 study was to evaluate the use of antibiotics for disease prevention, disease treatment, and growth promotion on U.S. dairies. Dairy 2002 also evaluated antibiotic practices and provided a baseline comparison for 2007 antibiotic-use practices. Producers completed a form detailing the number of animals displaying clinical signs of disease, the number treated with antibiotics, and then listed the antibiotic that was used for the majority of those animals during each study year. For the purposes of this information sheet, the term "antibiotic" refers to all antimicrobial drugs.

Preweaned heifers—disease prevention and growth promotion

Over one-half of operations (57.5 percent) fed medicated milk replacer to preweaned heifers in 2007, similar to the 55.7 percent of operations that did so in 2002. The most common medication in milk replacer was a combination of oxytetracycline and neomycin, which was used by 49.5 percent of operations in 2007 and 25.6 percent of operations in 2002.

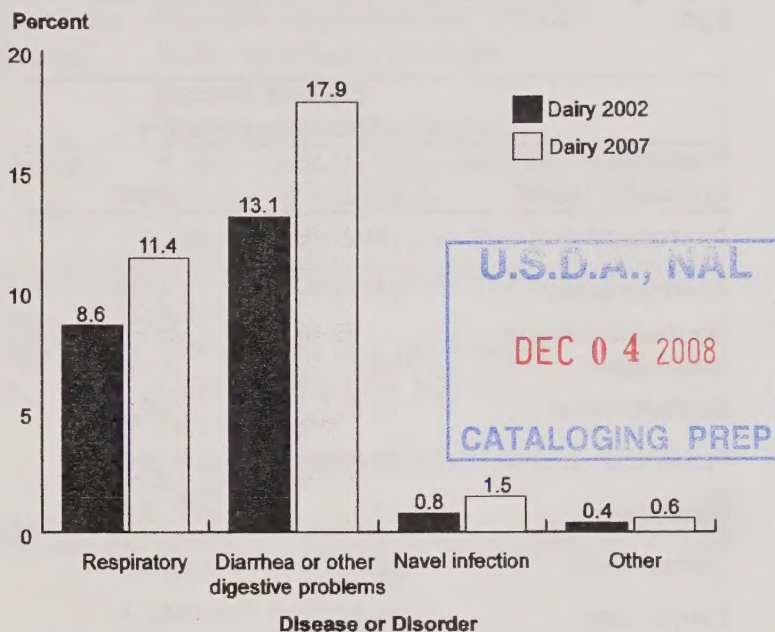
Disease treatment for preweaned heifers

In 2007, 17.9 percent of preweaned heifers were treated with antibiotics for diarrhea or other digestive problems during the previous 12 months, up from 13.1 percent in 2002. About 1 of 10 preweaned heifers (11.4 percent) were treated for respiratory disease in 2007 compared with 8.6 percent in 2002 (figure 1).

*States

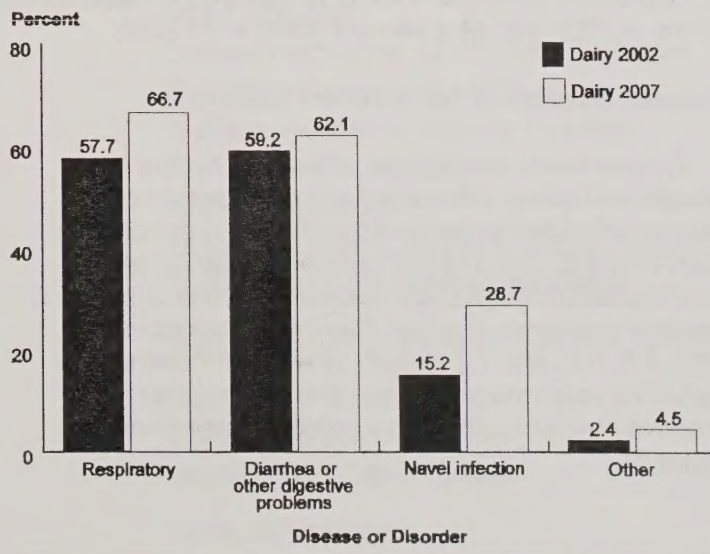
California, Idaho, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New Mexico, New York, Ohio, Pennsylvania, Texas, Vermont, Virginia, Washington, and Wisconsin.

Figure 1. Percentage of Preweaned Heifers Treated with Antibiotics for the Following Diseases or Disorders During the Previous 12 Months, 2002 and 2007



In 2007, 66.7 percent of operations used an antibiotic to treat preweaned heifers with respiratory disease, compared with 57.7 percent in 2002. Just under two-thirds of operations treated preweaned heifers with antibiotics for diarrhea or other digestive problems in 2007 and 2002 (62.1 and 59.2 percent of operations, respectively) [figure 2].

Figure 2. Percentage of Operations (Including Those not Reporting Diseases or Disorders) that Treated Preweaned Heifers with Any Antibiotic for the Following Diseases or Disorders During the Previous 12 months, 2002 and 2007



In 2007 and 2002, about one-fourth of preweaned heifers treated with antibiotics for diarrhea or other digestive problems received a sulfonamide as the primary antibiotic (table 1). Tetracycline was the next most common antibiotic used to treat diarrhea or other digestive problems in 2007 and 2002.

Table 1. For Preweaned Heifers Treated for Diarrhea or Other Digestive Problems During the Previous 12 Months, Percentage of Preweaned Heifers by Primary Antibiotic Used for Treatment, 2002 and 2007

Primary Antibiotic Used*	Percent Treated Preweaned Heifers	
	2002	2007
Aminocyclitol	NA	5.1
Aminoglycoside	11.5	11.5
Noncephalosporin beta-lactam	14.4	11.0
Cephalosporin	10.6	9.5
Florfenicol	3.8	5.2
Macrolide	7.1	2.8
Sulfonamide	23.8	23.3
Tetracycline	21.9	16.5
Other	6.9	15.1
Total	100.0	100.0

*See table 4 (insert) for antibiotic classes and common product names.

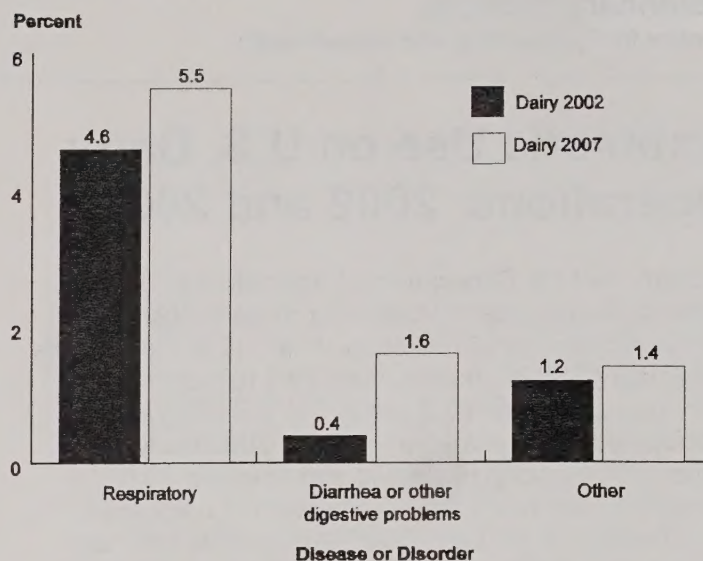
Weaned heifers—disease prevention and growth promotion

In 2007, 18.2 percent of operations used antibiotics other than ionophores in rations for weaned heifers, similar to the 17.5 percent of operations that did so in 2002. The use of ionophores remained the same, with 45.2 percent of operations using ionophores in heifer rations in 2007 and 44.2 percent doing so in 2002.

Disease treatment for weaned heifers

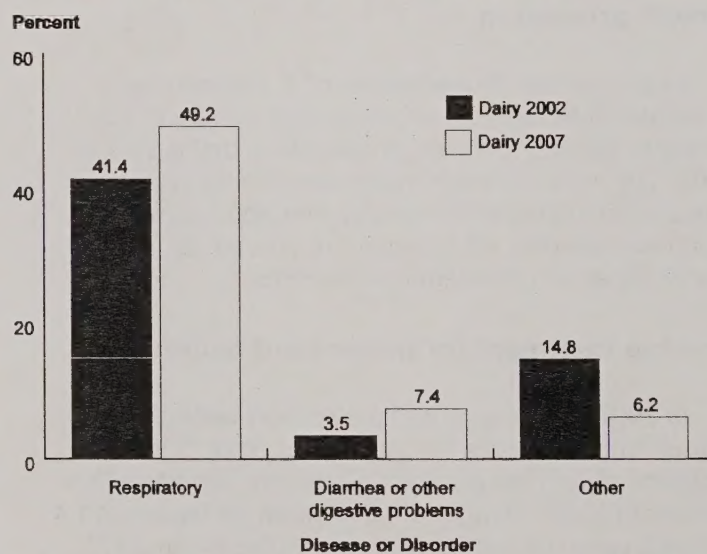
A much lower percentage of weaned heifers than preweaned heifers were affected by disease and thus fewer weaned heifers received antibiotic treatments. In 2007, only 5.5, 1.6, and 1.4 percent of weaned heifers were treated for respiratory disease, diarrhea or other digestive problems, or other disorders, respectively. In 2002, 4.6, 0.4, and 1.2 percent of weaned heifers were treated for respiratory disease, diarrhea or other digestive problems, or other disorders, respectively (figure 3).

Figure 3. Percentage of Weaned Heifers Treated with Antibiotics for the Following Diseases or Disorders During the Previous 12 Months, 2002 and 2007



In 2007, 49.2 percent of operations treated some weaned heifers for respiratory disease compared with 41.4 percent in 2002. A lower percentage of operations (generally less than 10 percent) treated weaned heifers for diarrhea or other diseases in 2007 and 2002 (figure 4).

Figure 4. Percentage of Operations (Including Those not Reporting Diseases or Disorders) that Treated Weaned Heifers with Any Antibiotic During the Previous 12 Months, 2002 and 2007



Antibiotic Use on U.S. Dairy Operations, 2002 and 2007

Table 4. Antibiotic classes and common product names

Antibiotic Class	Product Name	Antibiotic Class	Product Name
Aminocyclitol	Adspec®	Florfenicol	Nuflor Injectable Solution
Amino-glycoside	AmTech Neomycin Oral Solution	Lincosamide	Pirsue® Intramammary Infusion
	Biosol® Liquid	Florfenicol	Nuflor Injectable Solution
	Gentamicin	Macrolide	Draxxin™
	Neomix Ag® 325 Soluble Powder		Gallimycin®-100 Injection
	Neomix® 325 Soluble Powder		Gallimycin®-36 Intramammary Infusion
	Neomycin 325 Soluble Powder		Micotil® 300 Injection
	Neomycin Oral Solution		Tylan Injection 50/200 Tylosin Injection
	Neo-Sol 50	Other	AS700
	Strep Sol 25%		CORID 20% Soluble Powder
	Streptomycin Oral Solution		CORID 9.6% Oral Solution
Noncephalo- sporin Beta- lactam	Agri-Cillin™		Deccox-M
	Amoxi-Bol®		Linco-Spectin® Sterile Solution
	Amoxi-Inject®		TMZ
	Amoxi-Mast® Intramammary Infusion	Sulfonamide	20% SQX Solution
	Aquacillin™		Albon® Bolus
	Aqua-Mast Intramammary Infusion		Albon® Concentrated Sol. 12.5%
	Combi-Pen™-48		Albon® Injection 40%
	Crysticillin 300 AS Vet.		Albon® SR Bolus
	Dariclox® Intramammary Infusion		Di-Methox & 12.5% Oral Solution
	Duo-Pen®		Di-Methox Injection 40%
	Durapen™		Di-Methox Soluble Powder
	Hanford's/US Vet Masti-Clear Intramammary Infusion		Liquid Sul-Q-Nox
	Hanford's/US Vet/Han-Pen G/Ultrapen		SDM Injection
	Hanford's/US Vet/Han-Pen-B/Ultrapen B		SDM Injection 40%
	Hetacin®K Intramammary Infusion		SDM Solution
	Microcillin		Sulfadimethoxine 12.5% Oral Solution
	Pen-G Max™		Sulfadimethoxine Inj. 40%
	Penicillin G Procaine		Sulfadimethoxine Soluble Powder
	PFI-Pen G®		Sulfa-Nox Concentrate
	Polyflex®		Sulfa-Nox Liquid
	Princillin Bolus		Sulfaquinoxaline Sodium Solution 20%
	Pro-Pen-G™ Injection		SulfaSure™ SR Cattle/Calf Bolus
Cephalosporin	Cefa-Lak®/Today Intramammary Infusion		Sulmet® Drinking Water Solution 12.5%
	Excede™ Sterile Suspension		Sulmet® Oblets®
	Excenel® RTU		Sulmet® Soluble Powder
	Naxcel®		Sustain III® Cattle Bolus
	Spectramast™ LC Intramammary Infusion		Vetisulid Injection
	ToDAY® Intramammary Infusion		Vetisulid Powder

Antibiotic Class	Product Name
Tetracycline	Agrimycin™ 100
	Agrimycin™ 200
	AmTech Oxytetracycline HCL Solution Powder - 343
	Aureomycin® Soluble Powder
	Aureomycin® Soluble Powder Concentrate
	Bio-Mycin® 200
	Bio-Mycin® C
	CLTC 100 MR
	Duramycin-100
	Duramycin-200
	Liquamycin® LA-200®
	Maxim-200®
	Maxim™-100
	Oxy 500 and 1000 Calf Bolus
	Oxybiotic™ 200
	Oxycure™ 100
	Oxy-Mycin™ 100
	Oxy-Mycin™ 200
	Oxytetracycline HCL Soluble Powder
	Oxytetracycline HCL Soluble Powder 343
	Panmycin® 500 Bolus
	Pennchlor™ 64 Soluble Powder
	Pennox™ 200 Injectable
	Pennox™ 343 Soluble Powder
	Polyotic® Soluble Powder
	Promycin™ 100
	Solu/Tet Soluble Powder
	Terramycin® 343 Soluble Powder
	Terramycin® Scours Tablets
	Terramycin® Soluble Powder
	Terra-Vet 100
	Tet-324
	Tetra-Bac 324
	Tetracycline HCL Soluble Powder-324
	Tetradure™ 300

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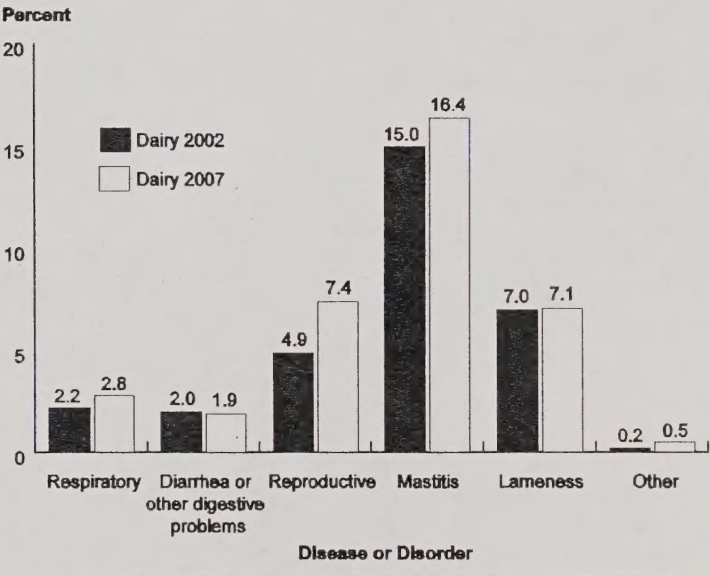
Cows—disease prevention

Nine of 10 operations (90.1 percent) used intramammary antibiotics at dry-off in 2007, similar to the 94.1 percent of operations that did so in 2002. About 80 percent of operations that used intramammary antibiotics at dry-off treated all cows on the operation. Penicillin G (procaine)/dihydrostreptomycin and cephalirin were the most commonly used intramammary antibiotics at dry-off.

Disease treatment for cows

Mastitis was the most commonly treated disease in cows in 2007 and 2002, with 16.4 and 15.0 percent of cows treated with antibiotics for mastitis, respectively. The percentage of cows treated with antibiotics for reproductive disorders increased from 4.9 percent in 2002 to 7.4 percent in 2007 (figure 5).

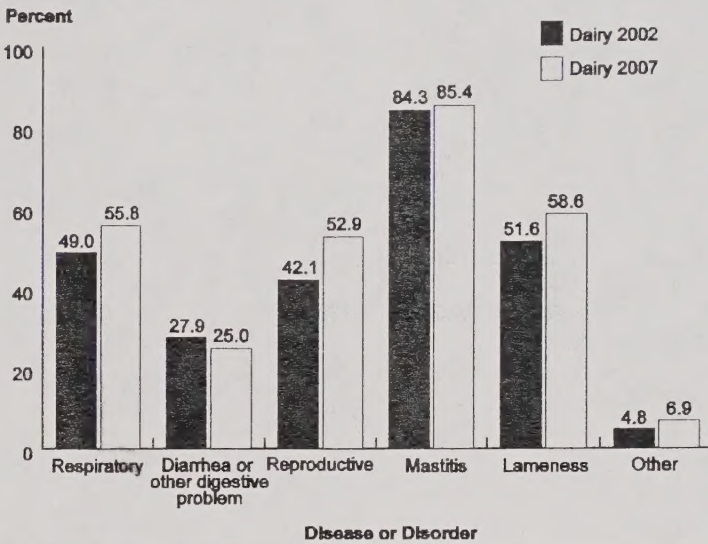
Figure 5. Percentage of Cows Treated with Antibiotics for the Following Diseases or Disorders During the Previous 12 Months, 2002 and 2007



The percentage of operations that used antibiotics to treat mastitis in cows remained unchanged (85.4 percent in 2007 and 84.3 percent in 2002). Overall, about one-half of operations used antibiotics to treat cows for respiratory disease, reproductive disorders, or lameness (figure 6).

Although a sizeable percentage of operations used antibiotics to treat respiratory disorders and diarrhea or other digestive problems, only a small percentage of cows were treated with antibiotics for these disorders in 2007 and 2002 (about 2 to 3 percent of cows).

Figure 6. Percentage of Operations (Including Those not Reporting Diseases or Disorders) that Treated Cows with Any Antibiotic for the Following Diseases or Disorders During the Previous 12 Months, 2002 and 2007



The primary antibiotics used to treat mastitis in 2007 were cephalosporin, lincosamide, and noncephalosporin beta-lactam, (53.2, 19.4, and 19.1 percent of treated cows, respectively) [table 2]. The use of noncephalosporin beta-lactam to treat cows with mastitis decreased substantially in 2007 compared with 2002 (19.1 and 33.8 percent of treated cows, respectively). This decrease may be due to the introduction since 2002 of a new cephalosporin.

Table 2. For Cows Treated for Mastitis During the Previous 12 Months, Percentage of Cows by Primary Antibiotic Used for Treatment, 2002 and 2007

Primary Antibiotic Used*	Percent Treated Cows	
	2002	2007
Aminocyclitol	NA	2.9
Aminoglycoside	1.0	0.2
Noncephalosporin beta-lactam	33.8	19.1
Cephalosporin	36.8	53.2
Florfenicol	0.0	0.0
Lincosamide	21.3	19.4
Macrolide	2.8	0.2
Sulfonamide	0.7	1.2
Tetracycline	3.1	2.0
Other	0.5	1.8
Total	100.0	100.0

*See table 4 (insert) for antibiotic classes and common product names.



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Almost one-half of cows treated for lameness in 2007 (42.1 percent) received tetracycline as the primary antibiotic (table 3). There was little change in the type of antibiotics used to treat lameness from 2002 and 2007.

Table 3. For Cows Treated for Lameness During the Previous 12 months, Percentage of Cows by Primary Antibiotic Used for Treatment, 2002 and 2007

Primary Antibiotic Used*	Percent Treated Cows For Lameness	
	2002	2007
Aminocyclitol	NA	0.0
Aminoglycoside	0.1	0.0
Noncephalosporin beta-lactam	17.3	19.5
Cephalosporin	29.8	27.2
Florfenicol	0.0	0.5
Macrolide	0.2	0.5
Sulfonamide	4.4	4.2
Tetracycline	42.4	42.1
Other	5.8	6.0
Total	100.0	100.0

*See table 4 (insert) for antibiotic classes and common product names.

Conclusions

Antibiotic use on U.S. dairy operations remained mostly unchanged from 2002 to 2007. Since 2002, just over half of operations have used medicated milk replacer. About 60 percent of operations used antibiotics to treat preweaned heifers for disease, primarily respiratory disorders and diarrhea or other digestive problems. Sulfonamide and tetracycline were the most common antibiotics used to treat preweaned heifers. The use of ionophores and other antibiotics in weaned heifer rations remained the same from 2002 to 2007. Respiratory disease was the most common condition treated with antibiotics among weaned heifers in 2002 and 2007. Mastitis was the most common disease in cows for which antibiotics were used. Cows with mastitis were treated with antibiotics by about 85 percent of operations, and approximately 90 percent of operations used intramammary antibiotics for cows at dry-off. Cephalosporin was the primary antibiotic used for treating mastitis in 2002 and 2007. Tetracycline was the primary antibiotic used to treat lameness for both study years.

For more information, contact:

USDA-APHIS-VS-CEAH
 NRRRC Building B, M.S. 2E7
 2150 Centre Avenue
 Fort Collins, CO 80526-8117
 970.494.7000
 E-mail: NAHMS@aphis.usda.gov
<http://nahms.aphis.usda.gov>

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